



PA – 3 Region **Mathematics and Science Partnership**

UNIT #1 TITLE: The Milky Way Galaxy

For use with grades: Elementary; Grades 1, 3, 4, and 5.



Developed by:

- **Kerri Cupstid**
- **Renee Ferretti-Smith**
- **Hagar Nero**
- **Erin Talley**
- **Brian Toth**

PA3 – MSP Calender

EVENT	NOTES	DATE
<u>September 18</u> Tue night mtg.	NA	9/18/12
<u>Fall Visit 1</u>		
<u>October 16</u> Tue night mtg.	<i>LESSON #1 DUE TONIGHT</i>	10/16/12
<u>Fall Visit 2</u>		
<u>November 27</u> Tue night mtg.	<i>LESSON #2 DUE TONIGHT</i>	11/27/12
	<i>H O L I D A Y B R E A K</i>	
<u>January 15</u> Tue night mtg.	<i>UNIT #1 DUE TONIGHT</i>	1/15/13
<u>Winter/Spring</u> <u>Visit 1</u>		
<u>February 19</u> Tue night mtg.	NA	2/19/13
<u>March 19</u> Tue night mtg.	<i>LESSON #1 DUE TONIGHT</i>	3/19/13
<u>Winter/Spring</u> <u>Visit 2</u>		
<u>April 16</u> Tue night mtg.	<i>POTENTIAL SPEAKER</i> <i>LESSON #2 DUE TONIGHT</i>	4/16/13
<u>May 21</u> (possibly May 15- East only) Tue night mtg.	<i>UNIT #2 DUE TONIGHT</i> <i>POST-TESTING</i>	5/21/13 Or May 15 (East)

ROLES AND RESPONSIBILITIES

TEAM NAME: Rainbow Rocks ☺

Team Member	Role	Responsibilities
Kerri Cupstid	Teacher	Carry out lessons one and two. Email Stan lessons one and two upon completion. Provide hard copy for unit coordinator.
Renee Ferretti-Smith	Teacher	Carry out lessons one and two. Email Stan lessons one and two upon completion. Provide hard copy for unit coordinator.
Hagar Nero	Teacher	Carry out lessons one and two. Email Stan lessons one and two upon completion. Provide hard copy for unit coordinator.
Erin Talley	Teacher Unit coordinator	Carry out lessons one and two. Collect hard copies of teachers' lessons and place in binder.
Brian Toth	Teacher	Carry out lessons one and two. Email Stan lessons one and two upon completion. Provide hard copy for unit coordinator.



PA – 3 Region **Mathematics and Science Partnership**

Participant Portfolio **2012 - 2013**

LESSON TITLE: The Milk Way Galaxy

LESSON AUHOR: Rainbow Teachers

GRADE (S) INSTRUCTING: 1, 3, 4, 5

SUBJECT AREA(S): Math and Science

CONTACT'S SCHOOL: Rainbow Elementary

REGION COORDINATOR: Stan Terzopolos

TEAM CONTACT PHONE: (610)-383-3780

TEAM CONTACT EMAIL: talleye@coatesville.k12.pa.us

TEAM CONTACT's SCHOOL MAILING ADDRESS:
Rainbow Elementary
1113 West Lincoln Highway
Coatesville, PA 19320

Unit #1 Outline

GRADE LEVEL(S):
Grades 1, 3, 4, and 5.
PA CONTENT STANDARDS:
E.U.1 A E.A.2 A E.D.2 A 3.3.4 B1 3.3.3 B2, D3 3.3.4 D3 3.3.7 A4, A5 M5.B.2.1.1 M5.B.2.1
ASSESSMENT ANCHORS:
E.U.1 A E.A.2 A E.D.2 A 3.3.4 B1 3.3.3 B2, D3 3.3.4 D3 3.3.7 A4, A5 M5.B.2.1.1 M5.B.2.1
ESSENTIAL QUESTION:
(DEVELOP A GLOBAL QUESTION THE UNIT IS DESIGNED TO ADDRESS)
What is the Milky Way Galaxy and what does it have to do with students?
UNIT OBJECTIVES:
<ul style="list-style-type: none"> • Construct the sun and the planets in order. • Locate the solar system and objects within it, specifically Earth. • Define astronomy and solar systems. • Explain types and characteristics of a spiral galaxy. • Build background knowledge and identify the Milky Way as a spiral galaxy. • Classify galaxies by size and shape. • Identify parts of all galaxies and differentiate between the three types. • Complete a scavenger hunt on-line with science partners about the Milky Way. • Utilize NASA websites and videos to gain new knowledge about our galaxy. • Practice skills used in scientific investigation: observation, identification of attributes, recognition of pattern, application to a new set of data. • Apply knowledge of galaxies to classify various objects from the Hubble Deep Field.

- Recreate a galaxy graphically.
- Students will create a 2-D or a 3-D model of the Milky Way Galaxy using school and home supplies, to include key information about planets.
- Examine pictures of galaxies to determine their scheme.
- Utilize the Hubble Tuning Fork Diagram to classify unidentified galaxies.
- Demonstrate an understanding of what classification means as it relates to science.
- Examine an unidentified galaxy image and attempt to classify it based on characteristics.

GENERAL MATERIALS NEEDED FOR UNIT: (include technology, NASA resources, etc...)

LCD projector
 Panaboard
 Student and teacher computers
 Computer lab
 Elmo/Visual presenter
 Journals/Science notebooks
 Pen/pencil
 Home/school supplies; glue, scissors, markers, crayons, etc.
 Chart paper
 Pre-made exit tickets
 NASA websites and videos
 NASA posters
 Pre-made teacher worksheets
 Google images

MODELING AND GUIDED INSTRUCTION: (the whole class will be involved in the following learning experience)

The following are examples of modeling and guided instruction within each lesson:

Kerri:

- Lesson definition.
- Anticipatory set overview and review.
- Webquest.
- Group work.
- Poster illustrations.
- Website exploration.

Renee:

- Recording facts.
- Group scavenger hunt.
- Website exploration.
- Model building.

Hagar:

- Whole group discussion.
- Context books.
- Journal writing.
- Poster illustrations.

- Website exploration.

Erin:

- Website exploration.
- Journal writing.
- Surveys.
- Venn Diagrams.
- Model building.
- Group presentations.

Brian:

- Website exploration.
- Model building.
- Group work stations.
- Webquest activity.

COLLABORATION/GROUP WORK: (problem-based/inquiry learning)

The following are examples of collaboration and group work within each lesson:

Kerri:

- Website exploration.
- Webquest activity.
- Group poster display of information.

Renee:

- Website exploration.
- Webquest activity.
- Group model building.

Hagar:

- Website exploration.
- Partner book read.
- Group and partner sun journal sketch.

Erin:

- Website exploration.
- Webquest activity.
- Group model building.

Brian:

- Website exploration.
- Webquest exploration.
- Group model building.
- Group and partner journal responses.

INDEPENDENT PRACTICE: (student exploration and elaboration)

The following are examples of independent practice within each lesson:

Kerri:

- Journal entry.
- Worksheet completion.
- Exit ticket.

Renee:

- Website facts worksheet completion.
- Journal entry.
- Scavenger hunt findings.
- Individual solar system information/facts to be used with the whole group.
- Exit ticket.

Hagar:

- Journal entry.
- Read aloud explanation.
- Sun sketch based on gathered facts.

Erin:

- Journal entry.
- Gathered facts after website exploration.
- Worksheet completion.
- Exit ticket.
- Score via rubric.
- Individual solar system model.

Brian:

- Solar system game outcomes.
- Webquest activity.
- Student worksheet creation.
- Galaxy identification.

ASSESSMENT/EVALUATION: (authentic student products and how assessed)

Formative:

As a whole, our group used the following forms of formative assessment:

- Galaxy models.
- Webquest completion.
- Comprehension worksheets.
- Brainstorm activities.
- Student feedback.
- Teacher observations.
- Teacher questioning.
- KWL chart.
- Whole group discussions.
- Exit tickets.
- Constructive pages.

Summative:

As a whole, our group used the following forms of formative assessment:

- Rubric scores.
- Graded comprehension worksheets.
- Performance tasks.
- Journal entries/written product.
- Oral product.
- Tests/quizzes.

Lesson Plan #1 – Unit #1

Author: Kerri Cupstid
Grade Level: 4th
Topic/Title: Galaxy Quest
Standards: Math - PA Common Core; Science - National Standards
Science: E.U.1 A E.A.2 A E.D.2 A
Objectives:
Students will be able to: <ul style="list-style-type: none"> • explain the characteristics of a spiral galaxy • identify the Milky Way as a spiral galaxy • locate the solar system, Earth and Sun in the Milky Way galaxy
Materials:
Students will be able to: <ul style="list-style-type: none"> • identify the Milky Way as a spiral galaxy • locate the solar system, Earth and Sun in the Milky Way galaxy • create a galactic address • explain the latest mission of NASA's Galaxy Evolution Explorer
Anticipatory Set:
Have you ever looked up at the night sky and wondered what else is out there? Well, you have been chosen for a very special mission. Your job is to search high and low to collect all the information you can about the Milky Way Galaxy. What is it? What does it look like? Where did it come from? What is it made of? Where is the earth/sun/solar system located in this galaxy? Are there others like it? This mission requires that you answer all of these questions and any others you can think of. Once you have successfully completed your task, you will begin work on the final stage of this mission. So get busy traveling and learning all that you can about our galaxy. You will need the information to be successful on the final stage of this mission ☺
Activities: (modeling, guided practice, independent practice & group work)
<ol style="list-style-type: none"> 1. Introduce and define lesson vocabulary (galaxy, interstellar medium, dark matter, nebulae). 2. Share Anticipatory Set with class. 3. Model how to conduct an internet search and record findings. <p>Guided Practice:</p> <ol style="list-style-type: none"> 4. Project webquest worksheet on the board. 5. Read and discuss the first question. 6. Click the link and read the article, highlighting key points that answer the question. 7. Record answer on the worksheet <p>Group Work:</p> <ol style="list-style-type: none"> 8. Break into groups of four. 9. Each group begins working through the webquest and recording their findings. 10. Teacher rotates and works with groups as needed.

11. Each group collects chart paper and markers.
12. Groups create a poster illustrating what they have learned.
Wrap-up:
13. Each group presents their poster and findings to the class.
14. Students write about what they learned in this lesson in their science notebooks.
14. Each student completes an exit ticket.
Evaluation / Assessment:
Completed Posters Exit Tickets Journal Entry

Milky Way Webquest

Dear Travelers,

You have been chosen for a very special mission. Your job is to search high and low to collect all the information you can about the Milky Way Galaxy. What is it? Where did it come from? What is in it? Where is the earth located in this galaxy? Are there others like it? This mission requires that you answer all of these questions and any others you can think of. Once you have successfully completed your task, you will begin work on the second stage of the mission. So get busy traveling and learning all that you can. You need the information to be successful on the final stage of this mission ☺

Follow the link in each section to locate the answer to the question. Write what you find in the box. As you travel, keep in mind what you might want to add to your poster and how you will illustrate it.



What is a solar system? Where is our solar system?

(Hint: Go to www.ask.com and type in your question)

What is a galaxy?

(Hint: Go to www.ask.com and type in your question)



What is the Local Group?

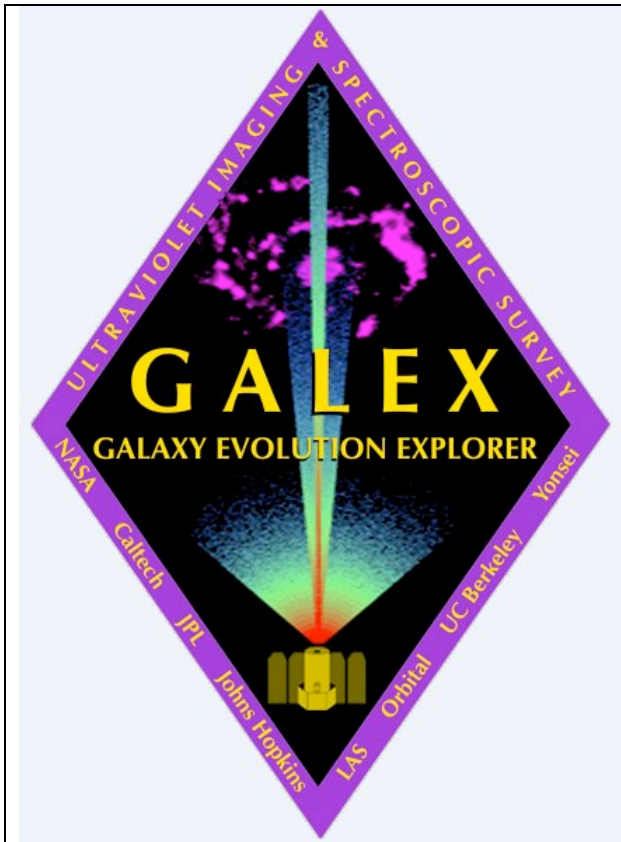
http://solarsystem.nasa.gov/kids/stars_kids.cfm



What is your galactic address?

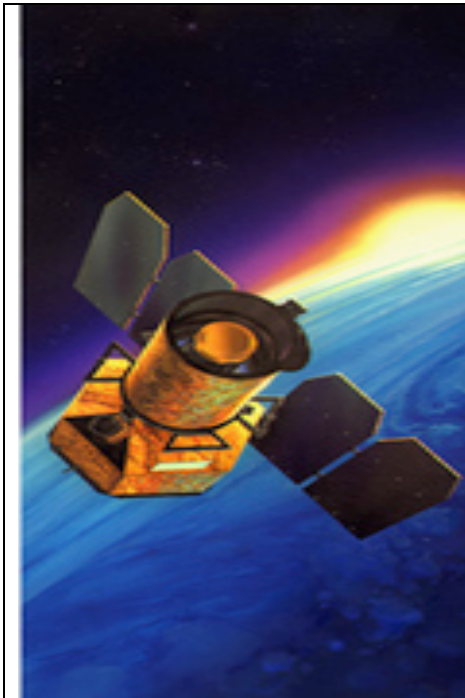
http://solarsystem.nasa.gov/kids/stars_kids.cfm

(Hint: Copy the address you find on the webpage here and fill in the blanks ★☒)



What is GALEX?

<http://spaceplace.nasa.gov/galaxy-montage2/en/>
<http://www.galex.caltech.edu/newsroom/glx2012-03r.html>



Watch this video:

Galaxy Evolution Explorer Turns Two
http://www.nasa.gov/mission_pages/galex/index.html

Use this space to sketch out your poster.



Exit Ticket

Name _____

Something I learned:

Something I would still like to learn or
need help with:

What I liked best about the lesson:



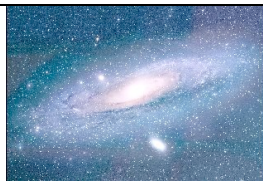
Exit Ticket

Name _____

Something I learned:

Something I would still like to learn or
need help with:

What I liked best about the lesson:



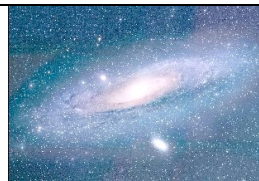
Exit Ticket

Name _____

Something I learned:

Something I would still like to learn or
need help with:

What I liked best about the lesson:



Exit Ticket

Name _____

Something I learned:

Something I would still like to learn or
need help with:

What I liked best about the lesson:

Lesson Plan #2 – Unit #1

Author: Kerri Cupstid	
Grade Level: 4th	
Topic/Title: This Planet or That One	
Standards: Math - PA Common Core; Science - National Standards	
Science: E.U.1 A E.A.2 A E.D.2 A	
Objectives:	
Students will be able to: <ul style="list-style-type: none"> • distinguish the differences and likenesses between rock and gas planets • locate two planets within our solar system • determine which planet would best support life 	
Materials:	
Project Worksheet	Computer
Venn Diagram	Elmo and Projector
Art Supplies	Panaboard
NASA Solar System Lithographs	
Websites:	
http://solarsystem.nasa.gov/kids/spaceschoolmusical.cfm http://pds.jpl.nasa.gov/planets/special/planets.htm	
Anticipatory Set:	
Now that you have become familiar with our solar system it is time to complete the final phase of your mission. Your job is to explore two planets to determine which would best support life. You will choose one rocky planet and one gas giant to compare and contrast. Collect as much information as you can about the two planets you chose. Where are they located within our solar system? What do they look like? What are they composed of? How are they alike? How are they different? You should answer these questions and any others you can think of to be successful in your mission. Once you have successfully completed your tasks, you will create a presentation of your choice (poster, shadow box, chart, powerpoint, etc.) to educate others on all that you learned. So get busy traveling the solar system in search of the information you need. Good luck 😊	
Activities: (modeling, guided practice, independent practice & group work)	
Introduction: <ol style="list-style-type: none"> 1. Share Anticipatory Set with class. 2. Warm Up: View the video <i>Planetary Posse</i> http://solarsystem.nasa.gov/kids/spaceschoolmusical.cfm 3. Brainstorm different ways to compare/contrast planets; make a list on the board. (Size, Temperature, Surface Material, Atmosphere, Distance from the Sun, Length of Year (Revolution), Length of day (Rotation), Mass, Diameter, Moons) 4. Hand out copies of the rubric and review the criteria. 	

Guided Practice/Modeling:

5. The teacher chooses two planets and models using the solar system lithographs and navigating the website to locate information.

(<http://pds.jpl.nasa.gov/planets/special/planets.htm>)

6. Put the Venn Diagram on the Elmo.

7. Teacher models locating and recording one example on the Venn Diagram.

Group Work:

8. Break into groups of four.

9. Each group begins working on their Venn Diagram using the NASA website to record their findings. Teacher rotates and works with groups as needed.

10. Once diagrams are completed, groups use the worksheet to plan their presentations.

Wrap-up:

11. Each group creates and presents their presentations to the class.

12. Students write about what they learned in this lesson in their science notebooks.

Evaluation / Assessment:

Completed Presentations

Rubric

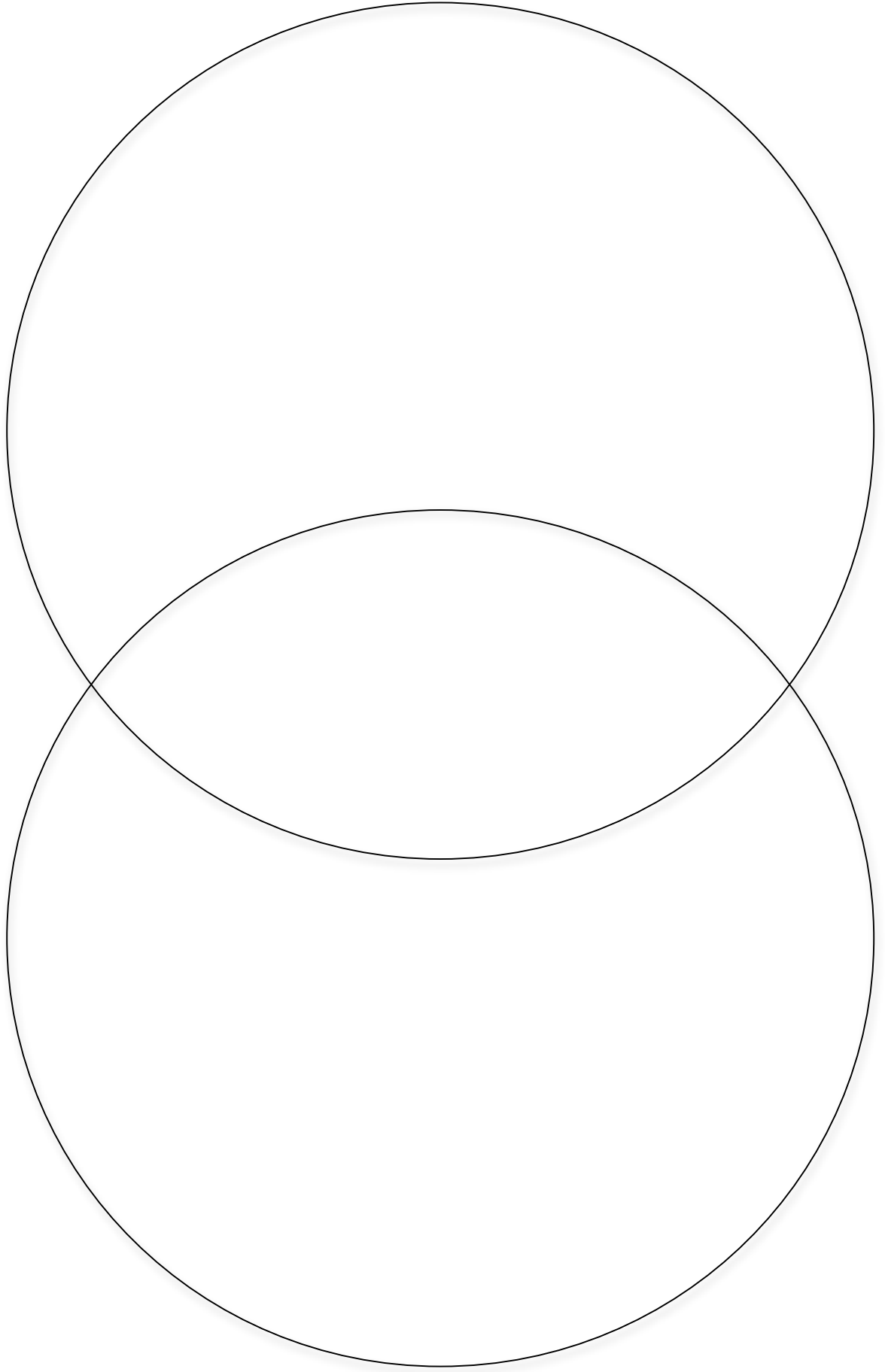
Notebook Entry

Planet Presentation Worksheet

Use this space to plan your presentation.

This Planet or That One

Planet: _____ Planet: _____



This Planet or That One

Scoring Rubric







Student Name: _____

CATEGORY	4	3	2	1
Writing - Organization	The presentation has a clear beginning, middle, and end.	Almost all of the presentation has a clear beginning, middle and end.	Most of the presentation has a clear beginning, middle and end.	Less than half of the presentation has a clear beginning, middle and end.
Content - Accuracy	All facts in the presentation are accurate.	99-90% of the facts in the presentation are accurate.	89-80% of the facts in the presentation are accurate.	Fewer than 80% of the facts in the presentation are accurate.
Writing - Mechanics	Capitalization and punctuation are correct throughout the presentation.	Capitalization and punctuation are correct throughout the presentation after feedback from an adult.	There are 1-2 capitalization and/or punctuation errors in the presentation even after feedback from an adult.	There are several capitalization or punctuation errors in the presentation even after feedback from an adult.
Attractiveness & Organization	The presentation has exceptionally attractive formatting and well-organized information.	The presentation has attractive formatting and well-organized information.	The presentation has well-organized information.	The presentation's formatting and organization of material are confusing to the reader.
Graphics/Pictures	Graphics go well with the text and there is a good mix of text and graphics.	Graphics go well with the text, but there are so many that they distract from the text.	Graphics go well with the text, but there are too few and it seems "text-heavy".	Graphics do not go with the accompanying text or appear to be randomly chosen.

Total Points: _____

Comments:

Lesson Plan #1 – Unit #1

Author: Renee Ferretti-Smith
Grade Level: 2 - 4
Topic/Title: We Live in the Milky Way!
PA Academic Standards: 3.3.4 B1 3.3.3 D3 3.3.7 A5
Objectives: Students will build background (facts) about the Milky Way Galaxy in science notebooks. Students will complete a scavenger hunt on-line with science partners about the Milky Way. Students will use NASA websites and videos to gain new knowledge about our galaxy.
Materials:  NASA sites & videos  NASA posters  Computer lab with Internet  Scavenger Hunt  LCD projector and PanaBoard  Science notebooks
Anticipatory Set: Welcome to the Milky Way! (displaying a poster and NASA computer image) Yes, you are commissioned to find as many facts about The Milky Way Galaxy as you can. You and your science partner will work as a team to record your findings in your notebooks. Once you have gathered some important facts, you will begin a computer search using NASA websites to answer some key questions about this yummy galaxy we live in. Be prepared to share your findings with your colleagues next week. Your team will display your findings in any way you prefer such as: powerpoint, display board, on a transparency, construction poster, et cetera. Let the search begin! http://science.nasa.gov/astrophysics/focus-areas/what-are-galaxies/

Activities: (modeling, guided practice, independent practice & group work)

Students will record Milky Way facts in their Science notebooks from Mind Set Video and Website discussion on PanaBoard.

Students will peruse NASA posters.

Students with assigned partners will work in the computer lab searching for facts from approved NASA websites and other bookmarked sites on computers.

Students will complete Scavenger Hunt sheet.

Students will share findings with group.

http://www.nasa.gov/mission_pages/GLAST/main/index.html

<http://www.nasa.gov/topics/universe/index.html>

http://www.nasa.gov/mission_pages/hubble/science/milky-way-collide.html

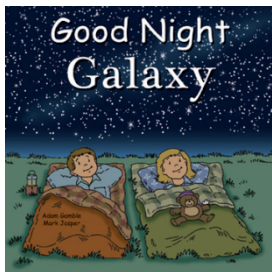
<http://andromida.hubpages.com/hub/milky-way-galaxy>

<http://www.outerspaceuniverse.org/6-random-facts-about-the-milky-way-galaxy.html>

<http://science.nationalgeographic.com/science/space/universe/galaxies-article/>

Wrap-up:

<http://www.5min.com/Video/What-is-the-Milky-Way-38356434>



Great Read Aloud

Evaluation / Assessment:

Science notebooks to be scored for effort and accuracy.

Student participation and partner work.

Scavenger hunt scored via rubric.

Names _____

Milky Way Galaxy Scavenger Hunt

1. What is the Milky Way?

Website:

2. Where is the Milky Way?

Website:

3. Why is it called the Milky Way?

Website:

4. Is our galaxy the only galaxy out there? Explain response.

Website:

5. Is the galaxy the same OR is it ever changing? Explain.

Website:

6. Write your questions here...

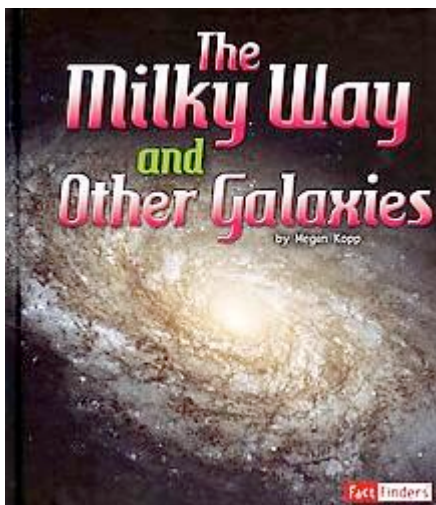
Lesson Plan #2 – Unit #1

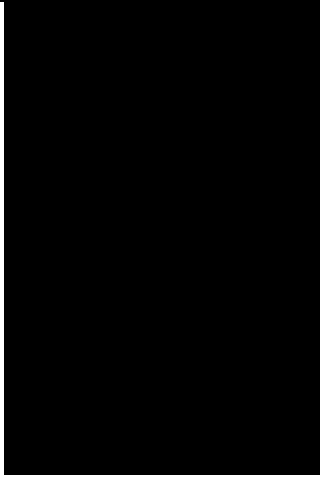
Author: Renee Ferretti-Smith
Grade Level: 2 - 4
Topic/Title: The Milky Way is Yummy!
PA Academic Standards: 3.3.4 B1 3.3.3 D3 3.3.7 A5
Objectives: Students will continue to build background knowledge on the Milky Way Galaxy. Students will create a 2-D or 3-D model of the Milky Way Galaxy using school and home supplies. Students will include key information about planets (Earth), stars, moons, etc..
Materials: <ul style="list-style-type: none">NASA sites & videosNASA postersMasking tape, string, glue, paper, crayons, markers, paints, yarn, ...Art supplies and home suppliesLCD projector and PanaBoardScience notebooks
Anticipatory Set: Welcome back Galaxy Members! (view short video clip) www.youtube.com/watch?v=y2CPrfPBfqk <i>You are now to continue to gather information about OUR Galaxy in order to learn what else is out there in the yummy Milky Way.</i> <i>You will use our cool NASA posters, science notebooks, scavenger hunt sheets, trade books, and the Internet websites and videos.</i> <i>You are commissioned to create a 2-D or a 3-D model of the yummy Milky Way Galaxy.</i> <i>Be prepared to share and explain your labeled parts.</i> <i>Let the creation begin!</i>
Activities: (modeling, guided practice, independent practice & group work)

With science teams, students will create a model showing the key components of the Milky Way Galaxy. Various materials will be used from home and school art room. Computers will be available for continued research besides books, posters, videos, fact sheets from previous lesson, et cetera. Students will have 4 science classes to complete this task.

Wrap-up:

<http://science.nationalgeographic.com/science/photos/galaxies-gallery/>





Evaluation / Assessment:

**Science teams will be scored for effort, cooperation & completion.
Models will be scored for accuracy, creative ability, and neatness.
(test grade)
Teams will explain in front of large group their creation/model of our
yummy galaxy.**

Unit 1 - Lesson Plan #1

Topic:
A Milky Way-Yeh-Let's Eat!
PA Academic Standards:
1.5.2 By the end of first grade, students will develop an understanding of the objects in the sky. 3.1 Unifying themes 3.1.C Illustrate patterns that regularly occur and reoccur in nature.
Objectives:
<ul style="list-style-type: none"> • Recognize objects in the sky (e.g., the sun, the moon, and stars). • Identify Earth as the planet we live on and in the Milky Way as our galaxy.
Materials:
http://solarsystem.nasa.gov/kids/stars_kids.cfm Cool Cosmos-Ask an Astronomer kids/AskKids/galazy.shtml">http://coolcosmos.ipac.caltech.edu/cosmic>kids/AskKids/galazy.shtml http://www.windows2universe.org/theuniverse/Milkyway.html Space by Carole Stott The story of the Milky Way-A Cherokee Tale by Joseph Bruchac/Gaylr Ross Galaxies by Paul Sipiera How Coyote Created the Milky Way by Lisa Tremblay Elinda who Danced in the Sky, an Estonian Folktale by Lynn Moroney Styrofoam cups Black paint Hole maker Flash lights The address game
Anticipatory Set:
What is space? Where is outer space? Discuss the many meaning of space and distinguish outer space with the students. Ask, what do they know about outer space. What do they know about the planets? How many planets are there?
Activities: (modeling, guided practice, independent practice & group work)
<p>Milky Ways are candy bars that we can enjoy. However the Milky Way we will learn about today is the galaxy that we live in. Does anyone know what the Milky Way is? Is the solar system the Milky Way? It is a spiral galaxy containing our solar system. The Milky Way is the galaxy which is the home of our solar system together with at least 200 billion other stars (more recent estimates have given numbers around 400 billion) and their planets. With the naked eye, it is observed as a faint luminous band stretching across the heavens, composed of approximately a trillion stars, most of which are too distant to be seen individually. We as a class are going to make our very own Milky Way here in class.</p> <p>Did you know that all of the stars you can see at night and many you do not see, along with the planets and our sun are all part of our galaxy? Who can name any parts of our solar system?</p> <p>Show and discuss http://solarsystem.nasa.gov/kids/stars_kids.cfm Read How Coyote Created the Milky Way.</p>

Discuss.

Review what our solar system looks like. Discuss our planet. Have students name the planets, and discuss the one we live on and where it is from the sun. Have the students conclude that all of these make up our solar system and that it is called the Milky Way. Show the shape of our system, which is a spiral.

Students will explore the contents by looking at the next site:

http://www.windows2universe.org/the_universe/Milkyway.html

Discuss.

Wrap-up:

To explore what one might see in looking at our Milky Way, students will make a similitude using Styrofoam cups and flash lights. Students will paint the cup, poke a hole in it, and use the flash lights to see our Milky Way.

Evaluation / Assessment:

Completed model
Student participation.

Unit 1 - Lesson Plan #2

Topic:
Science – Keeping a Space Journal
PA Academic Standards:
3.4. Physical Science, Chemistry and physics 3.4.4.D Recognize earth's place in the solar system Identify planets in our solar system and heir general characteristics Describe the solar system motions Explore technology
Objectives:
Students will construct the sun and the planets in order. Students will identify and relate Earth as the planet we live on Students will distinguish the milky way as our galaxy
Materials:
Space by Carole Stot Stars and Planets, Usborne Here in Space, David Milgrim What's in the Sky, Ian Smith I Wish I Were an Alien, Vivian French Interactive Solar System, Science Toys, Ltd www.starchild.gsfc.nasa.gov www.nasa.gov.sunforkids www.KidsAstronomy.com Carpet with planets and the sun in orbit Story telling Astronaut Puppet Space Songs Space Poems Space Journal Pencils crayons
Anticipatory Set:
What is space? Where is outer space? Discuss the many meaning of space and distinguish outer space with the students. Ask, what do they know about outer space. What do they know about the planets? How many planets are there?
Activities: (modeling, guided practice, independent practice & group work)
Read Space. Go through the book, Build background, bring out prior knowledge. Review each planet. Ask the students, how many planets are there after reading the book. Have the students use kid writing, if necessary to write the number of planets in their journal. Discuss Pluto and that it is considered a dwarf planet. Vocabulary: solar system, spinning, rotate, orbit, star, planets, dwarf, milky way, galaxy, hubble, telescope,

Explore and discuss on the solar system carpet in the front of the room. Sit on a planet in its orbit. Read, "What is a Star?" Elicit conversation about the relationship of the sun and the stars.

On the Panaboard pull up the planets. Students begin to see the order of the planets and what the orbit looks like. Students will write and draw pictures with their findings about the planets.

Students will look at pictures and posters. Discuss the planet we live on. Have students write a sentence about the planet we live on. Such as: Earth is the planet we live on. It is the blue planet because it has lots of water. Discuss our galaxy. Students write about the Milky Way galaxy. Such as: Our solar system is in the Milky Way galaxy.

Students will make a pencil drawing of the sun and the planets in their journal, and label them.

How did scientist get all of this information about the sun and the stars? Students will be led to technology and to telescopes and to what NASA does with the various satellites. Students will continue to explore and discover with www.KidsAstronomy.com

Wrap-up:

Students will have a better understanding of outer space. That scientists get this information from satellites, telescopes, etc. This is an introduction to the galaxy. This work will progress through continued readings.

Evaluation / Assessment:

Oral Responses, Discussions, Journal entries, Participation, Teacher Observation

Lesson Plan #1 – Unit #1

Author: Erin Talley	
Grade Level: 3	
Topic/Title: The Milky Way, no not the candy bar.	
PA Academic Standards:	
	3.3.3 B2 3.3.4 D3 3.3.7 A4
Objectives:	
Students will: <ul style="list-style-type: none"> • Define astronomy and solar system. • Build background knowledge on the Milky Way Galaxy. • Define galaxy and how our solar system is part of the Milky Way Galaxy. • Differentiate between the three types of galaxies. • Identify three galaxies and recreate the graphically. 	
Materials:	
Teacher computer and LCD projector Panaboard Science journals Pencil Computer lab time slots-or multiple days Chart paper Mr. Sketch markers Index cards Webpage guide Exploration Websites: http://amazing-space.stsci.edu/resources/explorations/galaxies-galore/ http://amazing-space.stsci.edu/resources/explorations/hdf/ http://amazing-space.stsci.edu/resources/explorations/impact/home.html http://amazing-space.stsci.edu/resources/explorations/trading/ http://school.discoveryeducation.com/schooladventures/universe/galaxytour/milkyway.html	
Anticipatory Set:	
Using the Panaboard, go to: http://www.astronomy-for-kids-online.com/definitionofastronomy.html . Students can explore the basic definitions of what astronomy is. Astronomy is commonly defined as the scientific study of the universe and celestial bodies especially their positions and movements as viewed through various astronomical instruments such as the naked eye, binoculars and telescopes of all sizes and magnification. Teacher takes students through various links to “check out” the website. Students may take notes in their science journal for future reference, if needed. List the following words on the board: <ul style="list-style-type: none"> • Solar systems • Galaxy • Sun and stars 	

- Comets
- Constellations

Scroll through the same website, define each word, and view sample pictures of each celestial being. Students will write all definitions in the vocabulary section of science journals. Illustrations will be accepted, in addition to the words.

Pass out index cards to all students.

Question on the board..."What do you want to learn about the Milky Way Galaxy?" "What questions do you have about the Milky Way galaxy?"

Students are to answer the question, collect all cards. (This will be used later to gauge students' understanding of the lesson).

Activities: (modeling, guided practice, independent practice & group work)

Reserve times in the computer lab, so all students are able to work on a computer! This lesson will probably take multiple times slots/cover more than one day!

Write <http://www.history.com/shows/the-universe/videos> on the white board.

Allow time for students to explore this website: they will be able to view the Universe, watch videos covering the basic cosmology of star creation and galaxies. The site has beautiful Hubble photos of immense galaxies and attempts to explain the concept of galaxies.

After approximately 15 minutes, gather student up front on the floor.

For our purposes, the best way to explain a galaxy, is to have students understand that a galaxy is of millions of solar systems. Size is the concept to be understood, the immense size of the universe and then of each galaxy, including our own Milky Way, and then all the millions of other galaxies in the universe.

Poll students to find background knowledge of types of galaxies.

Formally define three types of galaxies and display photos of each from:

<http://messier.lamost.org/seds/seds.org/messier/en/galaxy.html>

Discuss the similarities and differences of each, using a three-T chart.

Pass out the teacher-created page, students are to fill out while exploring in the next part.

Review all directions. Questions?

After briefly discussing the various types of galaxies, allow students to get back on the computer and use any of the following websites to explore space a little more:

<http://amazing-space.stsci.edu/resources/explorations/galaxies-galore/>

<http://amazing-space.stsci.edu/resources/explorations/hdf/>

<http://amazing-space.stsci.edu/resources/explorations/impact/home.html>

<http://amazing-space.stsci.edu/resources/explorations/trading/>

<http://school.discoveryeducation.com/schooladventures/universe/galaxytour/milkyway.html>

Also have library books available for students who prefer reading the "old fashioned way."

Wrap-up:

Share out-teacher created page. What did students learn or find interesting?

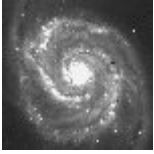
Evaluation / Assessment:

Pass out the index cards again.

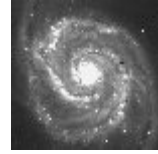
Students will state three facts that they have learned from the lesson on galaxies.

They also need to cite if their original questions were answered or not.

If not, what do they still need to know? Where will they be able to find this information?



<http://messier.lamost.org/seds/seds.org/messier/en/spir.html>



WEBPAGE QUESTIONS:

1. What is a galaxy?

2. What is the name of our galaxy?

3. Draw a picture of what our galaxy looks like to you:

4. Where is the Earth in our galaxy?

<http://messier.lamost.org/seds/seds.org/messier/en/spir.html><http://messier.lamost.org/seds/seds.org/messier/en/spir.html>

5. What is the closest galaxy like our own, and how far away is it?

6. What are the parts of a galaxy?

7. How are galaxies classified today?

8. What questions do you still have?

Lesson Plan #2 – Unit #1

Author: Erin Talley	
Grade Level: 3	
Topic/Title: The Milky Way, no not the candy bar.	
PA Academic Standards:	
	3.3.3 B2 3.3.4 D3 3.3.7 A4
Objectives:	
Students will: <ul style="list-style-type: none"> • Define astronomy and solar system. • Build background knowledge on the Milky Way Galaxy. • Build a scale model of the Milky Way Galaxy 	
Materials:	
Panaboard LCD projector Home/school supplies Teacher-created rubric Milky Way Galaxy Google images Websites: http://stardate.org http://www.astronomy.com/en/News-Observing/Astronomy%20Kids/2008/03/Home%20spiral.aspx http://www.3dgalaxymap.com/ http://sci2.esa.int/interactive/media/applets/3_1_1.htm http://sci2.esa.int/interactive/media/applets/3_1_1.htm http://cfcwork.uchicago.edu/kicp-projects/nsta/pdf/milky-way-model.pdf http://en.wikipedia.org/wiki/Milky_Way	
Anticipatory Set:	
Science day 1: Display http://stardate.org on the Panaboard. Peruse the website with students, answering questions along the way. Gather students up front and show the model of our solar system. Pass out instructions sheet (I plan to use version of the one provided at this website. It's too technical with all of the dimensions and such. I am going to scale it down, geared more toward third graders): http://mcdonaldobservatory.org/sites/default/files/pdfs/teachers/build_your_own_galaxy.pdf Display what the Milky Way Galaxy could look like; my model. Give students the option to work independently or with their science partners. My independent students are to go back to their seats and start planning. Groups meet together up front to plan.	
Activities: (modeling, guided practice, independent practice & group work)	
Allow students time to create their own Milky Way Galaxy. Have the following materials available:	

- NASA posters
- Student computers
- Solar System books, FOSS kit supplements
- Library books
- Previous websites
- Notes and survey from Lesson 1 Unit 1.

This activity will take MANY science days to complete. If students are lagging behind, they may be allowed to take the project home, with stipulations! ☺

Wrap-up:

“Museum” walk through to see everyone’s creations.

Evaluation / Assessment:

Scores for each model (group or individual) per teacher-created rubric.

Brian Toth

Lesson Plan #1 – Unit One

Topic:
Galaxies Galore
PA Academic Standards:
M5.B.2.1.1: Use a computer for design and application M5.B.2.1: Use appropriate tools to determine measurement
Objectives:
<ol style="list-style-type: none">1. Practice skills used in scientific investigation: observation, identification of attributes, recognition of pattern, application to a new set of data.2. Identify Earth as part of the Milky Way galaxy.3. Identify the parts of galaxies.4. Identify the types of galaxies.5. Classify galaxies by size and shape.6. Apply knowledge of galaxies to classify various objects from the Hubble Deep Field <p>PURPOSE: The purpose of this lesson is for students to gain a general understanding of the structure of galaxies such as their own galaxy (the Milky Way) and to acquire knowledge about the three main types of galaxies. Within this lesson the elementary student will develop skills required in scientific inquiry: recognition of pattern, identification of attributes, and classification. Galaxies Galore, Games and More provides students with an interactive lesson that allows for levels of understanding based on their ability and desire to learn about galaxies.</p>
Materials Needed:
<p>➤ This lesson requires a computer with a color monitor and an Internet connection. The Web browser used must have at least the capability of Netscape's Navigator 3.0. and the most recent version of Shockwave.</p>
Anticipatory Set:

Before attempting to complete this lesson, the student should:

1. Understand that some things in the universe are beyond visual sight and can only be seen using a telescope.
2. Understand that the universe is made up of planets, stars, planetary systems, and galaxies.
3. Demonstrate an ability to match similar objects.

Activities: (modeling, guided practice, independent practice & group work)

This is a self-directed interactive computer activity. Students may work independently or in small groups to complete each activity. Students will learn the parts of a galaxy and learn to classify galaxies by size and shape.

Suggested Engagement Activities:

1. Use images of galaxies taken from the Grab Bag or the Space Telescope Science Institute's Web site and project them on a screen or television monitor to generate interest.
2. Select some of the books from the literature list found in the Grab Bag section of this site. Have the books available in the classroom. Have students "shop the book store" and predict what topics all of the books have in common.
3. Check the extension activities for other ideas.

Step-by-step Instructions:

Galaxies Galore, Games and More consists of three modules. The first two modules should be completed before the Galaxy Games. In "Build Our Milky Way" students construct the galaxy we call home. In "Galaxies Galore" students learn to identify spiral, elliptical and irregular galaxies. In "Galaxy Games" students apply their observational skills and knowledge. Each page of the Web-based activity has two extensions: Galaxy Gossip and Galaxy Gallery. In Galaxy Gossip additional information is supplied. In Galaxy Gallery additional images that will extend the concept are supplied. In order to access both of these extensions it is necessary for the student to pass the cursor onto the boxes and click the mouse.

Build Our Milky Way:

This is an interactive construction of our spiral galaxy, the Milky Way. Students click on picture parts that will light up in their correct position in a large picture of our galaxy. A definition will be displayed after the galaxy part is illuminated. Additional information

about our galaxy can be found by linking to Galaxy Gallery and Galaxy Gossip.

Galaxies Galore:

Spiral galaxies - This is an interactive matching activity where students drag color images of spiral and barred spiral galaxies to black and white pictures of identified spiral categories. Information about each classification group can be obtained upon completion of each image. Extended information can be obtained from Galaxy Gossip and Galaxy Gallery.

Elliptical Slide - This is an interactive game where students use a slide bar to light up and show the classification of elliptical galaxies. Definitions can be found on EO and E7 galaxies. Knowledge of ellipticals can be extended by the use of Galaxy Gossip and Galaxy Gallery.

Imagine Irregulars - Animations are used to demonstrate the sorting of objects into known galaxy categories. In the process students learn that it is sometimes necessary to create a new category. Irregular galaxies and the concept of colliding galaxies are introduced. Additional information is provided in Galaxy Gossip and Galaxy Gallery.

Galaxy Games:

Galaxy Concentration - Students can use their visual discrimination ability to match picture-to-picture images of galaxies. Students will flip cards to match Hubble images.

Galaxy Trading Cards - Students can use their knowledge of galaxy classification categories to play a card game matching pictures to facts. When the activity is completed the student will have created a mosaic picture of the galaxy M51.

Galaxy Hunt - This interactive assessment uses images from the Hubble Deep Field. Students match various galaxies observed in the deep field to the corresponding classification. A tally records the number of each type of galaxy observed by the student. Additional information can be obtained from Galaxy Gallery and Galaxy Gossip.

Galaxy Gallery:

An extension of the concept found on each page. The additional images enhance the material found on the page.

Gravity Gossip:

An extension found on each page that provides the student with additional background information.

Wrap-up questions:

Evaluation / Assessment:

After completing the first two modules, where students identify parts of galaxies and

different types of galaxies, the final module allows the students to apply their knowledge. In the card games students observe, categorize, and separate a Hubble image into an appropriate classification. In the Hubble Deep Field activity students observe, identify as to type, and quantify the types of galaxies observed.

Brian Toth

Lesson Plan #2 – Unit One

Topic:
Classifying Galaxies
PA Academic Standards:
M5.B.2.1.1: Use a computer for design and application M5.B.2.1: Use classification system for galaxies
Objectives:
Students will : 1- Examine pictures of galaxies. 2- Discover that these pictures have been arranged according to a scheme or plan laid out by Edwin Hubble in the 1920's. 3- Practice using the scheme, called the Hubble Tuning Fork Diagram, to classify unidentified galaxies, as presented in pictures. 4- Display the knowledge gained during this activity using a worksheet presented by the teacher. 5- Demonstrate an understanding of what "classification" means as it relates to science. 6- Examine an unidentified galaxy image and attempt to classify it based on the methods that they have learned PURPOSE 1) You will become familiar with the Hubble Tuning Fork Diagram, a system of classification for galaxies invented in the 1920's by the noted astronomer Edwin Hubble. It is still in use today. 2) You will practice the technique, useful in science, of engaging a scheme or plan to <i>classify</i> objects in a group. In this lesson you will be able to look at images of different kinds of galaxies, taken by the world's best telescopes. In most high school astronomy texts and in some earth science texts, the Hubble Tuning Fork Diagram is presented as a way to <i>classify</i> , or put into groups, the various types of galaxies observed in space. If you are not studying galaxies, this lesson still might be useful. It follows, in an organized way, the process by which scientists group or <i>classify</i> objects in nature. The lesson is designed to be used either way.

Materials Needed:
<ul style="list-style-type: none"> ➤ This lesson requires a computer with a color monitor and an Internet connection. The Web browser used must have at least the capability of Netscape's Navigator 3.0. and the most recent version of Shockwave. ➤ Student worksheet
Anticipatory Set:
<p>Before attempting to complete this lesson, the student should:</p> <ol style="list-style-type: none"> 4. Understand that some things in the universe are beyond visual sight and can only be seen using a telescope. 5. Understand that the universe is made up of planets, stars, planetary systems, and galaxies. 6. Demonstrate an ability to match similar objects.
Activities: (modeling, guided practice, independent practice & group work)
<p>Teacher Component</p> <p>In any study of "the Universe", the subject of galaxies normally will be covered by the teacher. If the teacher decides to go into more detail, and to present the idea of different types of galaxies that exist in the universe, this activity would be an excellent follow-up to an initial teacher introduction. We see this activity as a group workstation activity involving one group or many groups. It could be used as an extension of a classroom presentation. It also could be used as a review, if the Hubble Tuning Fork Diagram is covered by the teacher.</p> <p>It has been designed so that just two main ideas are presented:</p> <ol style="list-style-type: none"> 1) the scheme of Edwin Hubble's Tuning Fork Diagram. 2) practice in using his scheme as an example of how scientists attempt to

classify objects in nature.

Students will begin the lesson at the blinking message: "Start your galaxy exploration here". Students will indicate their mastery of the objectives by responding to questions on a paper worksheet. The worksheet should be copied and printed, and handed to students to complete as they participate in the activity. A worksheet you may use is provided at the end of this section, followed by a copy of the worksheet with answers (Teacher Key) for your use.

One way to print the student worksheet for this lesson is to click on "File" at the top of your web-browser screen, and select "Print" if your computer has a printer available. If you do not have a printer accessible from your browser, you can click on "File", and select "Save as" to save the worksheet to a floppy disk. You can then use the file in a word processor.

There are many fascinating links to this subject that we have found. We would particularly like to recommend this one: "[Cosmic Classifier](#)", one of four astronomy activities at the "[Hubble Deep Field Academy](#)". We mention it in the student activity specifically as an option, but you should take a look at it. You may want to assign it as well. We think it is a perfect extension and follow-up of our simple activity. It is not particularly difficult, and would be appropriate for upper elementary or middle school students. **NOTE:** The "Cosmic Classifier" activity will require your computer to be able to use **Adobe Acrobat Reader**, which is available for free download at the site.

There are other excellent links which are noted and described under "Extensions" in the Table of Contents.

Student Component

Students will begin the lesson at the blinking message: "Start your galaxy exploration here". Students will indicate their mastery of the objectives by responding to questions on a paper worksheet.

[Get Student Worksheet](#)

[Get Worksheet Answer Key](#)

[Go to Student Lesson](#)

Wrap-up questions:

See Assessment

Evaluation / Assessment:

Lesson Plan Assessment

1. Students will mark their progress by answering questions on a worksheet . This worksheet is provided online for teachers to copy. Teachers may also copy an answer key,

also provided online, to check on students' progress.

2. Students will use an ONLINE activity to classify galaxies by placing images of galaxies on the Hubble Tuning Fork diagram, using the classification scheme developed by Edwin Hubble.

3. Students will examine an unidentified galaxy image, and attempt to classify it based on the methods that they have learned.

IMPLEMENTATION PLAN

Unit #1

A. One videotaped lesson is required per unit, saved on CD-ROM (include in CD ROM sleeves in portfolio).

Anticipated Lesson for Taping: After PSSA testing.

Planned Taping date(s) Spring 2013

B. A professional development component is required for each unit. This requirement may be met in any one of the following forms (or another of your choice):

- Professional development training to colleagues
- Local program to share with community
- Presentation at a conference
- Video documentary to duplicate and share with others
- Online resources and video for district website
- Professional publication
- Other: _____
- Other: _____

C. Plan of implementation (Meetings, events, etc.): As a group, we will meet and discuss the layout of our unit each CCIU meeting night. In addition to that, we will meet as necessary at Rainbow, before our contractual day. Hagar and Erin plan to work together to complete our lessons, since we instruct the younger grades. Kerri, Renee, and Brian will work together to complete the lessons, since they instruct the older grades.

UNIT PROGRESSION FORM: Unit # 1

Group/Coordinator: Erin Talley

Date: January 8, 2013

UNIT ASSESSMENT

The degree to which the lesson(s):	√	Write a statement to describe how this item was met.
Identified the prior knowledge required by the students.	x	In each lesson, all teachers activated prior knowledge using an engaging anticipatory set.
Identify and/or provide an authentic real-world problem relevant to the students for them to solve	x	Our topic of the galaxy is about as “real world” as you get.
Was aligned with PA standards.	x	Every lesson taught must be accurately aligned with our PA state standards. They drive our instruction.
Followed problem-based/inquiry learning model.	x	In each lesson, all teachers provided at least one problem-based/inquiry learning model for students to participate in.
Allowed for student exploration and elaboration.	x	What would the lesson be without student exploration and elaboration? That’s when students get the most out of the concept at-hand.
Required authentic student products.	x	One example would be the galaxy model building; both individually and in groups.
Integrated technology into the lesson(s).	x	Technology is always included in each lesson. Technology excited the kids and assist in the learning process.
Clearly defined how students would be assessed.	x	All assessments are listed and very precise.
Utilized and incorporated NASA resources throughout lesson(s).	x	NASA materials are always included in each lesson.

GROUP ASSESSMENT (see next page for details)

The group showed:	√	Write a statement to describe how this item was met.
Contributions/participation, Attitude	x	100% participation from everyone! Attitudes in check! ☺
Cooperation/Working with others	x	We all work as a team.
Focus on task/commitment	x	Everyone involved is focused and keeps our goal in sight.
Team role fulfillment	x	All team members followed the rules and stuck to deadlines.

Group Signatures: _____ **Date:** _____
 _____ **Date:** _____
 _____ **Date:** _____
 _____ **Date:** _____
 _____ **Date:** _____

Group Work Rubric

Team Participant Names: Kerri Cupstid, Renee Ferretti-Smith, Hagar Nero, Erin Talley, and Brian Toth

Skills	Basic	Sound	Thorough	Extensive
Contributions/participation Attitude	Seldom cooperative, rarely offers useful ideas. Is disruptive.	Sometimes cooperative, sometimes offered useful ideas. Rarely displays positive attitude.	Cooperative, usually offered useful ideas. Generally displays positive attitude.	Always willing to help and do more, routinely offered useful ideas. Always displays positive attitude.
Working with others/cooperation	Did not do any work – does not contribute, does not work well with others, usually argues with teammates.	Could have done more of the work – has difficulty, requires structure, directions and leadership, sometimes argues.	Did their part of the work – cooperative. Works well with others, rarely argues.	Did more than others – highly productive. Works extremely well with others, never argues.
Focus on task/commitment	Often is not a good team member. Does not focus on the task and what needs to be done. Lets others do the work.	Sometimes not a good team member. Sometimes focuses on the task and what needs to be done. Must be prodded and reminded to keep on task.	Does not cause problems in the group. Focuses on the task and what needs to be done most of the time. Can count on this person.	Tries to keep people working together. Almost always focused on the task and what needs to be done. Is very self-directed.
Team role fulfillment	Participate in few or no group meetings. Provided no leadership. Did little or no work assigned by the group.	Participated in some group meetings. Provided some leadership. Did some of the work assigned by the group.	Participated in most group meetings. Provided leadership when asked. Did most of the work assigned by the group.	Participated in all group meetings, assumed leadership role as necessary. Did the work that was assigned by the group.
Communication/listening Information sharing	Rarely listens to, shares with, or supports the efforts of others. Is always talking and never listens to others. Provided no feedback to others. Does not relay any information to teammates.	Usually listens to, shares with, and supports the efforts of others. Sometimes talks too much. Provided some effective feedback to others. Relays some basic information – most relates to the topic.	Almost always listens to, shares with, and supports the efforts of others. Seldom talks too much. Provides good feedback to others. Relays solid basic information – usually relates to the topic.	Always listens to, shares with, and supports the efforts of others. Provided effective feedback to other members. Relays a great deal of information – all relates to the topic.

<http://www.google.com/#hl=en&q=group+work+rubric&aq=f&oq=&aqi=g4&fp=flbC24gbdiA>